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three cotyledons, when the root is triarch); among cycads the cotyledonary bundles are not of equal value in the production of root structure, and even similarly situated bundles vary in the same species; among the cycads the cotyledonary bundles fuse with the plumular traces and ultimately form a central cylinder of variable structure.

Root.—In *Ginkgo* there may be an addition of protoxylem elements after the root structure has been organized; in *Stangeria* the primary root may branch dichotomously; after the initial root structure has been attained, the number of poles may be increased at lower levels.

The paper closes with a very useful table showing the variation in the number of bundles in the base of the cotyledons of the fourteen species discussed, and also the relation of this number to the number of poles in the root structure.—J. M. C.

Adaptation in fossil plants.—In his presidential address¹⁸ at the anniversary meeting (May 24) of the Linnean Society, SCOTT took occasion to outline the evidence for adaptation from fossil plants, which naturally dealt chiefly with the anatomical structures of those ancient vascular plants which he has done so much to elucidate. No one is more competent to state the facts in reference to ancient plants, but the conclusions do not seem to be irresistible. In substance they are as follows: (1) at all known stages in the history of plants there has been a thoroughly efficient degree of adaptation to the conditions existing at each period; (2) the characters of plants always having been as highly adaptive as they are now, natural selection appears to afford the only key to evolution which we possess at present; (3) the paleontological record reveals only a relatively short section of the whole evolution of plants, during which there has not been any very marked advance in organization, except in cases where the conditions have become more complex, as illustrated by the floral adaptations of angiosperms; (4) the simple forms of the present flora are reduced rather than primitive, but such reduction may have set in often at a relatively early stage of evolution, and is therefore consistent with a considerable degree of antiquity in the reduced forms.

These broad statements, quite apart from their application to certain views of adaptation, contain much wholesome truth for those who imagine that the paleontological record, as we know it, represents a continuous succession of "higher and higher" plants, for it is becoming increasingly evident that very highly organized plants existed at the very beginning of our record.—J. M. C.

Morphology of Penaeaceae.—STEPHENS published a preliminary account¹⁹ of his studies among the Penaeaceae which was noticed in this journal.²⁰ There has now appeared the full account with illustrations,²¹ so that the morphological

¹⁸ SCOTT, D. H., Presidential address before Linn. Soc., 1909. pp. 15.

¹⁹ STEPHENS, E. L., A preliminary note on the embryo sac of certain Penaeaceae. *Annals of Botany* 22:329. 1908.

²⁰ BOT. GAZETTE 45:365. 1908.

²¹ STEPHENS, E. L., The embryo sac and embryo of certain Penaeaceae. *Annals of Botany* 23:363-378. *pls.* 25, 26. 1909.